Assignment 1 | FPGA Lab

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1 Question

A training institute intends to give scholarships to its students as per the criteria given below :
• The student has excellent academic record but is financially weak.

OR

• The student does not have an excellent academic record and belongs to a backward class.

OR

• The student does not have an excellent academic record and is physically impaired.
The inputs are:
INPUTS
A: Has excellent academic record
F: Financially sound
C: Belongs to a backward class
I: Is physically impaired (In all the above cases 1 indicates yes and 0 indicates no).
Output : X [1 indicates yes, 0 indicates no for all cases]
Draw the truth table for the inputs and outputs given above and write the SOP expression for X(A,F,C,I).

2 Solution

2.1 Truth Table

A	F	C	I	**X**
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

2.2 Karnaugh Map for given truth table

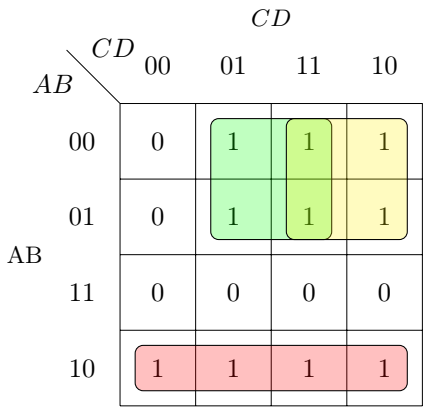

Figure 2.1: Karnaugh-Map

2.3 SOP EXPRESSION

X=A.F' +A'.C +A'.I

To implement it using NAND Logic, we convert the simplified SOP expression to suite the NAND logic, which gives :

$$F = \overline{\overline{A.\overline{F}}.\overline{\overline{A}.C}.\overline{\overline{A}.I}}.$$